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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Jan Mattheus Botha, et al. Art Unit : Unknown
Serial No. : 10/019,471 Examiner : Unknown
Filed : December 28, 2001
Title : HIGH TEMPERATURE METATHESIS PROCESS

Commissioner for Patents
Washington, D.C. 20231

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TRANSMITTAL OF PRIORITY DOCUMENT UNDER 35 USC § 119

Applicants hereby confirm their claim of priority under 35 USC § 119 from South Africa
Application No. 99/04380 filed July 6, 1999. A certified copy of the application from which
priority is claimed is submitted herewith.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 8-12-02

Y. Rocky Tsao
Y. Rocky Tsao
Reg. No. 34,053

Fish & Richardson P.C.
225 Franklin Street
Boston, Massachusetts 02110-2804
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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the attached document is a true copy of the Provisional
Specification forming part of the patent application in the
name of SASOL TECHNOLOGY (PROPRIETARY) LIMITED,
filed at the South African Patent Office under No. 1999/4380
in terms of Section 38 (2) of the South African Patents Act.

Geteken te
Signed at

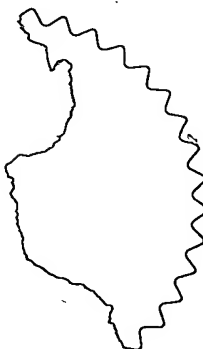
PRETORIA

in die Republiek van Suid-Afrika, hierdie
in the Republic of South Africa, this

14th

dag van
day of

May 2002



[Signature]
Registrateur van Patente
Registrar of Patents

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT
[Section 30 (1) - Regulation 22]

REPUBLIC OF SOUTH AFRICA
REVENUE
FORM P1

06.07.99 2 006000

HABR 080
11/6/00/01

REPUBLIC OF SOUTH AFRICA
Revenue stamps or revenue franking machine
impression

Official date stamp

The grant of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.

21	01	994380
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(i) APPLICANT'S OR AGENT'S REFERENCE

F221

FULL NAME(S) OF APPLICANT(S)

(ii) 71 **SASOL TECHNOLOGY (PTY) LTD**

ADDRESS(ES) OF APPLICANT(S)

(iii) 1 STURDEE AVENUE, ROSEBANK
JOHANNESBURG 2196

REGISTRAR OF PATENTS, DESIGNS,
TRADE MARKS AND COPYRIGHT

PRIVATE BAG, PRIVAATSAK X400

1999 -07- 06

PRETORIA 0001

REGISTRAR VAN PATENTE, MODELLE
HANDELSMERKE EN OUTEURSREG

TITLE OF INVENTION

(iv) 54 **HIGH TEMPERATURE METATHESIS PROCESS**

(v) The applicant claims priority as set out on the accompanying form P2.
The earliest priority claimed is

(vi) This application is for a patent of addition to Patent Application No. 21 01

(vii) This application is a fresh application in terms of section 37 and is based on Patent Application No. 21 01

This application is accompanied by:

(viii)

X	1.	A single copy of a provisional XXXXXXX specification of 9 pages.	21	01
X	2.	Drawings of 1 sheets.		
	3.	Publication particulars and abstract (form P8 in duplicate).		
	4.	A copy of Figure of the drawings for the abstract.		
	5.	An assignment of invention.		
	6.	Certified priority document(s) (state number):		
	7.	Translation of the priority document(s).		
	8.	An assignment of priority rights.		
	9.	A copy of the form P2 and the specification of SA Patent Application No.	21	01
	10.	A declaration and power of attorney form P3.		
	11.	Request for ante-dating on form P4.		
	12.	Request for classification on form P9.		
X	13.	Form P2 + copy		

(ix) 74 Address for service: **HAHN & HAHN, 222 Richard Street, HATFIELD, 0083 Pretoria**

Dated this 06 day of July 19 99

Signature of applicant or agent

This duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with an official stamp

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REGISTRAR VAN PATENTE, MODELLE
HANDELSMERKE EN OUTEURSREG

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
PROVISIONAL SPECIFICATION
[Section 30 (1) - Regulation 27]

OFFICIAL APPLICATION NO.		
21	01	994380

LODGING DATE	
22	06/07/99

FULL NAME(S) OF APPLICANT(S)	
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71	SASOL TECHNOLOGY (PTY) LTD
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FULL NAME(S) OF INVENTOR(S)	
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72	JAN MATTHEUS BOTHA, ALTA SPAMER, MUZIKAYISE MTHOKOZISI JUSTICE MBATHA, BONGANI SIMON NKOSI
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TITLE OF INVENTION	
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54	HIGH TEMPERATURE METATHESIS PROCESS
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HIGH TEMPERATURE METATHESIS PROCESS

This invention relates to a high temperature metathesis process. In particular, the invention relates to the optimisation of the high temperature metathesis process to improve selectivity for a desired product range.

The applicant is aware that olefins in the C_9 to C_{14} may be used as detergent and plasticizer precursors as well as for alkylation of benzene, and that C_{15} to C_{18} olefin ranges may be used as drilling fluids and drilling fluid precursors, amongst other uses.

Conventional thinking was that linear olefins may be used to produce linear alkyl benzene and linear oxo-alcohols which could be used to produce detergents and plasticizers which were believed to be both bio-degradable and suitable for their intended purpose. Thus, previously efforts were concentrated on producing linear oxo-alcohols and lineal alkyl benzene, and thus efforts were focused on linear olefins from which these could be made.

Recently, however, a new wave of thinking has lead to the belief that non-linear oxo-alcohols as well as non-linear alkyl chain alkyl benzene could be used alone or together with their linear counterparts for the production of said detergents and plasticizers. In particular short chain branched olefins are believed best suited to produce such non-linear products. Thus, recent efforts have concentrated on the delinearization of the linear olefins in order to use such olefins in the production of the non-linear products.

Surprisingly, after extensive research, the applicant has found that a peculiar olefin composition in the C₉ to C₁₈ range, having both linear and non-linear olefins may be made by metathesis of Fischer-Tropsch olefins in the C₅ to C₁₅ range.

5

Thus, according to a first aspect of the invention, there is provided a high temperature metathesis process for the metathesis of Fischer-Tropsch olefins in the C₅ to C₁₅ range, said metathesis process including the step of subjecting a Fischer-Tropsch olefin feedstock in the C₅ to C₁₅ range to metathesis reaction conditions, said olefin feedstock including mono-methyl branched olefins.

10

The high temperature metathesis process may be carried out at a temperature of between 300°C to 600°C.

15

Typically the high temperature metathesis process is carried out at a temperature of between 450°C and 550°C.

The operating pressure of the high temperature metathesis process may be between 1 and 30 bar, or even higher.

20

The high temperature metathesis process may use a tungsten or molybdenum based catalyst, for example, WO₃ or MoO₃, supported or unsupported, with or without co-catalysts. The support can typically be SiO₂, Al₂O₃, ZrO₂, TiO₂, or mixtures thereof.

25

The high temperature metathesis process Fischer-Tropsch olefinic feedstock in the C₅ to C₁₅ range may include linear alpha olefins, mono-methyl branched olefins, paraffins, dienes, aromatics, and the like.

5

Typically, the Fischer-Tropsch olefinic feedstock includes one or more olefins selected from the C₅ to C₉ range.

The product of the high temperature metathesis process may include one or more mono-methyl branched olefins in the C₉ to C₁₈ range.

The product of the high temperature metathesis process may include one or more linear olefins in the C₉ to C₁₈ range.

The product of the high temperature metathesis process may include one or more mono-methyl branched olefins and one or more linear olefins in the C₉ to C₁₈ range. The olefins of the product may be internal olefins.

The product of the high temperature metathesis process may be used in the production of alkyl benzene, plasticizers, detergents, drilling fluids, and the like, having both a linear fraction and a branched fraction (for alkyl benzene the alkyl chain is branched or linear).

Typically, the branched fraction will be mono-methyl branched. However, the branching may be di-methyl, ethyl, and/or propyl.

According to a second aspect of the invention, there is provided a high temperature metathesis process for the metathesis of olefins in the C₅ to C₁₅ range, said metathesis process including the step of subjecting an olefinic feedstock in the C₅ to C₁₅ range to metathesis reaction conditions, the process including the recycling of a part of the product of the metathesis reaction to the reaction to increase the selectivity for a desired product range.

The olefinic feedstock may be a Fischer-Tropsch olefinic feedstock including mono-methyl branched olefins.

Typically, the olefinic feedstock includes one or more olefins in the C₅ to C₉ range.

Where the desired product range includes olefins in the C₉ to C₁₈ range, the process includes a separation stage wherein a recycle fraction in the C₅ to C₈ range is separated from the product and recycled to the reaction.

The quantity of recycle in the feedstock may be selected to provide a C₉ and higher selectivity of above 50%.

Generally, the quantity of recycle in the feedstock is selected to provide a C₉ and higher selectivity of above 50%.

Typically, the recycle makes up between 20% and 80% of the reaction feedstock.

Usually, the recycle makes up between about a third and three
5 quarters of the reaction feedstock.

The total yield of high temperature metathesis process product in the C₉ to C₁₈ range is above 40%.

10 Typically, the total yield of high temperature metathesis process product in the C₉ to C₁₈ range is about 50%.

The total feedstock conversion of the high temperature metathesis process of the invention is typically in the range of 60% to 90%, usually about
15 80%.

The ratio of linear to branched high temperature metathesis process products is typically greater than 1:1.

20 Usually, the ratio of linear to branched high temperature metathesis process products is greater than 2:1.

Generally, the ratio of linear to branched high temperature metathesis process products is about 3:1.

25

The branching of the high temperature metathesis process products is predominantly mono-methyl branching, although some di-methyl, ethyl, and/or propyl branching may also be present.

5 The product of the high temperature metathesis process may be used in the production of alkyl benzene, plasticizers, detergents, drilling fluids, and the like, having both a linear fraction and a branched fraction (for alkyl benzene the alkyl chain is branched or linear), the ratio of linear to branched fractions being related to the ratio of linear to branched high temperature
10 metathesis process products used in their production.

The invention will now be described, by way of non-limiting illustration only, with reference to the accompanying line diagram.

15 In the diagram, reference numeral 10 generally indicates a high temperature metathesis process broadly in accordance with the invention.

The process 10 includes a reactor 12 operated at between 450°C and 550°C and at an operating pressure of between 1 and 30 bar. A Fischer-
20 Tropsch olefinic feedstock 14 including mono-methyl branched olefins, is fed into the reactor 12. The feedstock 14 includes olefins in the C₅ to C₉ range.

Usually the feedstock 14 will be purified of oxygenates which may poison the catalyst by extractive distillation (not shown), prior to being fed to
25 the reactor 12.

The reaction product 16 includes both linear and branched internal olefins in the C₂ to C₁₈ range.

5 The reaction product 16 is fed to a separator 18 where it is cut into a light product stream 20 including C₂ to C₄, a recycle stream 22 including C₅ to C₈, and a heavy product 24 including product in the desired C₉ to C₁₈ range.

10 The recycle stream 22 is combined with the feedstock 14 to form the total feedstock of the reactor 12.

The recycle stream 22 is between a third and and three quarters of the feedstock 14.

15

The total yield of heavy product stream 24 is about 50%, while the feedstream 14 conversion is about 80%, with a selectivity for C₉ to C₁₈ of about 60%.

20

The ratio of linear to branched product in heavy product stream 24 is about 3:1.

The applicant believes that it is an advantage of the invention as illustrated, that the high operating temperatures result in a high degree of resistance to poisoning of the metathesis catalyst by feedstock components,
5 such as branched olefins, dienes, aromatics, and the like.

The applicant believes that it is a further advantage of the invention as illustrated that by recycling a cut of the product which is below the desirable carbon length range, high selectivity to desired products is achieved..

10

DATED THIS 6TH DAY OF JULY 1999

15



HAHN & HAHN INC.
Agent for Applicant

